STUDIES OF URANIUM MINERALS:

AN ALTERATION PRODUCT OF IANTHINITE

By Judith W. Frondel and Frank Cuttitta

Trace Elements Investigations Report 367

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*This report concerns work done on behalf of the Division of Raw Materials of the U. S. Atomic Energy Commission

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A Katanga specimen labeled ianthinite and consisting of purple-colored minute needles and laths was sent by J. F. Vaes to the Harvard University mineral collection several years ago. The mineral resembles ianthinite in the hand specimen, but chemical analysis gave only a trace of UO_2 and a formula of $UO_3 \cdot 2H_2O$ (table 1), although ianthinite reportedly contains only quadrivalent uranium and has a formula of $2UO_2 \cdot 7H_2O$ (Schoep, 1930). The mineral probably is an alteration product of ianthinite, the U^4 being almost completely oxidized to U^6; it may be epiianthinite, inadequately described by Schoep and Stradiot (1947). The purple color of the mineral is due to the trace of UO_2. Although epiianthinite is yellow, the optical properties of the alteration product are more like those of epiianthinite than those of ianthinite (table 2).

The X-ray powder pattern of the alteration product is distinctive and cannot be confused with that of schoepite which has practically the same chemical composition. Authentic X-ray powder data are lacking for ianthinite and epiianthinite. X-ray Weissenberg study, using copper radiation, gave a sharp lattice pattern with $a_o = 7.17$, $b_o = 11.46$ and $c_o = 15.02$ Å; $a_o : b_o : c_o = 0.6257 : 1 : 1.311$. The measured specific gravity is slightly less than 3.5 (minute needles of the mineral rose very slowly to the surface of Clerici solution of sp. gr. = 3.503), and the calculated specific gravity is 3.46_7, assuming 8 formula units of $UO_3 \cdot 2HO_2$ per unit cell.

Table 1.--Chemical analyses of ianthinite and of an alteration product of ianthinite.

	1	2	3	4
UO_2	< 0.1	--	--	--
UO_3	87.83	88.64	88.60	--
U_3O_8	--	--	--	[82.90]
H_2O-	1.06	11.36	11.40	15.85 (ignition loss)
HO_2+	11.26	--	--	--
Fe_2O_3	--	--	--	1.25
Total	100.15	100.00	100.00	[100.00]

1 Alteration product of ianthinite; analyst, Frank Cuttitta.

2 Analysis 1 recalculated to 100 after deducting $H_2O-(110^{\circ})$.

3 Theoretical composition $UO_3 \cdot 2H_2O$.

4 Ianthinite (Schoep, 1930).

This study is part of a program undertaken by the Geological Survey on behalf of the Division of Raw Materials of the Atomic Energy Commission.

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